

THAT WHICH IS CLAIMED:

1. An isolated polypeptide comprising the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53.

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2. An isolated nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of:

a) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

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b) a nucleotide sequence that corresponds to an antisense sequence for the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

c) a nucleotide sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54; and

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d) a nucleotide sequence that hybridizes to any one of the nucleotide sequence of a) - c) under stringent conditions, or a complement thereof.

3. The nucleic acid molecule of claim 2, wherein said sequence encodes an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53.

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4. A chimeric gene comprising a promoter capable of driving expression of a sequence in a plant cell operably linked to a nucleotide sequence of claim 2.

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5. The chimeric gene of claim 4, wherein the nucleotide sequence encodes an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53.

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6. The chimeric gene of claim 4, wherein said nucleotide sequence is the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54.

5 7. The chimeric gene of claim 4, wherein said nucleotide sequence is the antisense sequence of the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54.

10 8. A vector comprising the chimeric gene of claim 4.

9. A plant cell transformed with the chimeric gene of claim 4.

10. A plant comprising the chimeric gene of claim 4.

15 11. A transformed plant having incorporated into its genome a DNA molecule, said molecule comprising a nucleotide sequence operably linked to a promoter capable of driving expression of a gene in a plant cell, wherein said nucleotide sequence is selected from the group consisting of:

20 a) a sequence encoding an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53;

25 b) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

c) a nucleotide sequence that corresponds to an antisense sequence for the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

30 d) a nucleotide sequence that corresponds to an antisense sequence for a plant invertase inhibitor;

e) a nucleotide sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

f) a nucleotide sequence encoding a yeast invertase enzyme; and

5 g) a nucleotide sequence that hybridizes to any one of the nucleotide sequence of a) - f) under stringent conditions, or a complement thereof.

12. The transformed plant of claim 11, wherein the nucleotide sequence encodes an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11,
10 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53.

13. The transformed plant of claim 11, wherein the nucleotide sequence is the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19,
15 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54.

14. The transformed plant of claim 11, wherein the nucleotide sequence is an antisense sequence for a plant invertase inhibitor.

15. The transformed plant of claim 11, wherein the nucleotide sequence is a yeast
20 invertase.

16. The transformed plant of claim 11, wherein said plant is a dicot.

17. The transformed plant of claim 11, wherein said plant is a monocot.

18. The transformed plant of claim 17, wherein said plant is maize.

19. Transformed seed of the plant of any one of claims 16-18.

20. A method for modulating invertase activity in a plant cell, said method
30 comprising transforming said plant with a DNA construct, said construct comprising a

promoter that drives expression in a plant cell operably linked with a nucleotide sequence selected from the group consisting of:

a) a sequence encoding an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44,

5 47, 50, or 53;

b) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

10 c) a nucleotide sequence that corresponds to an antisense sequence for the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

d) a nucleotide sequence that corresponds to an antisense sequence for a plant invertase inhibitor;

15 e) a nucleotide sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

f) a nucleotide sequence encoding a yeast invertase enzyme; and

20 g) a nucleotide sequence that hybridizes to any one of the nucleotide sequence of a) - f) under stringent conditions, or a complement thereof.

21. A method for increasing yield in a plant, said method comprising transforming said plant with a DNA construct, said construct comprising a promoter that drives expression in a plant cell operably linked with a nucleotide sequence selected from the group consisting of:

a) a sequence encoding an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

30 b) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

c) a nucleotide sequence that corresponds to an antisense sequence for the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

5 d) a nucleotide sequence that corresponds to an antisense sequence for a plant invertase inhibitor;

e) a nucleotide sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

10 f) a nucleotide sequence encoding a yeast invertase enzyme; and

g) a nucleotide sequence that hybridizes to any one of the nucleotide sequence of a) - f) under stringent conditions, or a complement thereof.

22. A transformed plant cell having incorporated into its genome a DNA molecule,
15 said molecule comprising a promoter capable of driving expression of a gene in a plant cell operably linked to a nucleotide sequence selected from the group consisting of:

a) a sequence encoding an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53;

20 b) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

25 c) a nucleotide sequence that corresponds to an antisense sequence for the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

d) a nucleotide sequence that corresponds to an antisense sequence for a plant invertase inhibitor;

30 e) a nucleotide sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

- f) a nucleotide sequence encoding a yeast invertase enzyme; and
- g) a nucleotide sequence that hybridizes to any one of the nucleotide sequence of a) - f) under stringent conditions, or a complement thereof.

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